

### **ABSTRACT OF THE DISCLOSURE**

A droplet/electrospray device and a liquid chromatography-electrospray system are disclosed. The droplet/electrospray device comprises a substrate defining a channel between an entrance orifice on an injection surface and an exit orifice on an ejection surface, a nozzle defined by a portion recessed from the ejection surface surrounding the exit orifice, and an electrode for application of an electric potential to the substrate to optimize and generate droplets or an electrospray. A plurality of these electrospray devices can be used in the form of an array of miniaturized nozzles. The liquid chromatography-electrospray device comprises a separation substrate defining an introduction channel between an entrance orifice and a reservoir and a separation channel between the reservoir and an exit orifice, the separation channel being populated with separation posts perpendicular to the fluid flow. A cover substrate is bonded to the separation substrate to enclose the reservoir and the separation channel adjacent the cover substrate. The exit orifice of the liquid chromatography device is homogeneously interfaced with the entrance orifice of the electrospray device to form an integrated single system. Procedures for fabrication of the electrospray devices of the present invention are also disclosed.